

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Thomas P. Glenn, Steven Webster, Roy Dale Hollaway  
 Assignee: Amkor Technology, Inc.  
 Title: FLIP CHIP ON GLASS IMAGE SENSOR PACKAGE  
 Serial No.: 09/713,848 Filed: November 13, 2000  
 Examiner: Graybill, D. Group Art Unit: 2827  
 Docket No.: G0030

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J. McMillan  
 10/2/02  
 entered  
 J. McMillan

Monterey, CA  
 September 18, 2002

10/7/02

Assistant Commissioner for Patents  
 Box AF  
 Washington, D.C. 20231

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AMENDMENT UNDER 37 C.F.R. §116

Dear Sir:

In response to the Office Action dated July 18, 2002,  
 enclosed herewith are:

1. A separate paper entitled "Clean Copy of Replacement Claims" with a clean version of the claims (6 pages); and
2. A separate paper entitled "Version with Markings to Show Changes Made" with markings to show amendments to the claims (4 pages).

The above papers are incorporated herein by reference in their entireties as a part of this paper.

REMARKS

Claim 1, 11, 13, 21, 27, 28, and 29 have been amended for purposes of clarity as discussed below. Support for the amendment of Claims 1 and 27 appears in the specification at least at page 2, lines 30-32; page 5, lines 29-32; page 8, lines 19-21; and in FIGS 2 and 3. Support for the amendment of Claims 11, 13, 28, and 29 appears in the specification at least at page 3, lines 9-12; page 9, lines 11-16; and in FIGS. 2, 3, and 9-11. Support for the amendment of Claim 21 appears in the specification at least at page 8, lines 19-21; page 9, lines 11-16; and FIGS. 2 and 3.

Claims 1 and 3-20 satisfy 35 U.S.C. 112, first paragraph.

With reference to Claim 1, the Examiner states:

**Claims 1 and 3-20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The undescribed subject matter is the language "and having a total area less than a total area of said first surface of said image sensor."**  
(Office Action, page 2, emphasis added.)

In amended Claim 1, the two occurrences of the word "total" have been deleted.

Consequently, Applicants submit that the Examiner has not presented evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention that indicates that Applicants had possession of the invention as recited in Claim 1, as amended.

Accordingly, amended Claim 1 satisfies 35 U.S.C. 112, first paragraph. In addition, Claims 3-20, which depend

directly or indirectly from Claim 1, satisfy 35 U.S.C. 112, first paragraph for the same reasons as Claim 1.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

Claims 3, 11, 13, 25, 27, and 29 satisfy 35 U.S.C. 112, second paragraph.

**A. Claims 3 and 25**

Regarding Claims 3 and 25 the Examiner states:

In claims 3 and 25 the **scope of the term "chip size" is unclear because there is no art recognized definition** of the term, ... . (Office Action, page 2, emphasis added).

The Examiner's statement is respectfully traversed.

In Glenn et al (USPN 6,291,884), which is cited by the Examiner in combination with Takase, et al. in the rejection below, "chip sized" is described and defined. Glenn et al '884 teaches that:

In this first embodiment, the substrate has an area that is somewhat less than that of the chip, and is mounted in the center of the chip such that its edges are inboard of the edges of the chip to expose bonding pads on the periphery of the underlying chip. By mounting the rigid substrate such that the first terminals are confined within the area of the chip, **the resulting BGA, LGA or LCC package is "chip sized," i.e., has an area substantially equal to that of the chip itself.** (Column 2, lines 52-59, emphasis added).

Consequently, Applicants submit that Claims 3 and 25 satisfy 35 U.S.C. 112, second paragraph.

**B. Claims 11 and 13**

Regarding Claims 11 and 13, the Examiner states:

In claims 11 and 13 there is ambiguous and confusing literal antecedent basis for the term "said pad." (Office Action, page 3).

Claims 11 and 13 have been amended to change "said pad" to "said electrically conductive pad" thereby clarifying the antecedent basis of "said pad".

Accordingly, Claims 11 and 13, as amended, satisfy 35 U.S.C. 112, second paragraph.

In addition, Claims 21, 28, and 29 have been amended likewise to clarify the literal antecedent basis of the terms in these claims.

**C. Claims 27 and 29**

Regarding Claims 27 and 29, the Examiner states:

In claims 27 and 29 **there is insufficient basis for the language "the area of said window" and "the area of said first surface of said image sensor."**  
(Office Action, page 3, emphasis added).

With regard to Claim 27, Applicants point out that Claim 27 has been amended and now recites in pertinent part:

An image sensor package comprising: ...  
a window having an interior surface, **the area of said interior surface of said window** being less than the area of said first surface of said image sensor; ...

(Emphasis Added).

Applicants submit that both the "interior surface of said window" and the "first surface of the image sensor" inherently include areas. Thus, recitation of "the" area of said interior surface of said window and "the" area of said first surface of said image sensor is proper. The Manual of Patent Examining Procedure (M.P.E.P.) states:

**Inherent components of elements recited have antecedent basis** in the recitation of the components

themselves. For example, the limitation "the outer surface of said sphere" would not require an antecedent recitation that the sphere has an outer surface.

(M.P.E.P. § 2172.05(f); page 2100-200, August 2001, emphasis added).

Accordingly, Claim 27 satisfies 35 U.S.C. 112, second paragraph.

With regard to Claim 29, the Examiner's statement above is respectfully traversed.

Claim 29 recites in pertinent part:

An image sensor package comprising: ...  
a window mounted to said image sensor, **the area of said window in a plane parallel to said first surface of said image sensor ...;**

(Emphasis Added).

Applicants respectfully submit that "the" area of said window is clearly and unambiguously defined in the claim as the inherent area of the recited window "in a plane parallel to said first surface of said image sensor".

Thus, recitation of "the" area of said window in a plane parallel to said first surface of said image sensor is proper at least for reasons similar to Claim 27.

In addition, with regard to Claim 29, the Examiner further states:

In claim 29 the limitation "the area of said window in a plane parallel to said first surface of said image sensor being less than the area of said first surface of said image sensor in said plane" is incompatible with the limitations "a plurality of electrically conductive bumps electrically and physically connecting said bond pads to said interior traces." (Office Action, page 3, emphasis added).

Applicants point out that Claim 29 has been amended and the language, "in said plane" noted by the Examiner, has been deleted. The incompatibility cited by the Examiner is thereby eliminated.

Accordingly, Claim 29, as amended, satisfies 35 U.S.C. 112, second paragraph.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

Claims 1, 3-15, 20-23, and 26-28 patentable over Takase, et al. (USPN 5,463,229) in view of Glenn et al. (USPN 6,291,884).

Applicants note that Claim 2 was cancelled in the Amendment filed April 17, 2002. Accordingly, rejection of Claims 2 is moot.

Regarding Applicants' independent Claims 1, 21, and 27 the Examiner admits:

However, **Takase does not appear to explicitly teach** the following:

1. A structure comprising a window having a total area less than a total area of said first surface of said image sensor. ...

...21. An image sensor package comprising a plurality of electrically conductive pads on said exterior traces; and a plurality of electrically conductive interconnection balls on said pads. ...

...27. The area of said window being less than the area of said first surface of said image sensor. ...  
(Office action, portions of pages 8-9, emphasis added.)

Applicants respectfully submit that the Examiner's reliance on the Glenn et al. '884 as prior art in combination with Takase et al. for the above purpose of rejecting applicants independent Claims 1, 21, and 27 is improper.

Applicants represent that Glenn et al., USPN: 6,291,884, and the invention of this application, serial number 09/713,848, filed November 15, 2000, were, at the time the invention of application serial number 09/713,848 was made,

owned by and subject to an obligation of assignment to Amkor Technology, Inc., Chandler, AZ (US).

Therefore, Applicants respectfully submit that Glenn et al. '884 is not prior art by operation of 35 U.S.C. § 103(c) as amended November 29, 1999 (Pub. L. 106-113, §4807, 113 Stat. 1501A-591) for the purpose of rejection of Claims 1, 3-15, 20-23, and 26-28 under 35 U.S.C. § 103(a).

Applicants respectfully point out 35 U.S.C. § 103(c) states:

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

(35 U.S.C. § 103(c) as amended November 29, 1999 Pub. L. 106-113, §4807, 113 Stat. 1501A-591.)

Glenn et al. '884, cited as prior art by the Examiner, meets the requirement of 35 U.S.C. § 103(c) related to common ownership or common obligation of assignment at the time of the invention of this application serial number 09/713,848. In addition, Glenn et al. qualifies as prior art, if at all, only under subsection (e) of 35 U.S.C. § 102. Finally, the current application was filed after the effective date, (November 29, 1999), of applicable amendments to 35 U.S.C.

Consequently, Applicants respectfully submit that the Examiner has failed to point out where any combination of proper prior art of record, discloses, teaches or suggests a structure as recited in Claim 1 or an image sensor package as recited in Claims 21 and 27. Therefore, Applicants respectfully submit that independent Claims 1, 21, and 27 are allowable over the proper prior art of record.

Claims 3-15, 20 and 28 depend directly or indirectly from Claim 1. Claims 22, 23, and 26 depend directly or indirectly from Claim 21. Consequently, Claims 3-15, 20, 22, 23, 26, and

28 are allowable for at least the same reasons as their respective base Claims.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

Claims 16-19, 24, and 25 are patentable over Takase, et al. (USPN 5,463,229) in view of Glenn et al. (USPN 6,291,884) and further in view of Glenn 5,949,655.

As noted above, Glenn, et al. '884 is not proper prior art with respect to the present invention.

Consequently, Applicants respectfully submit that the Examiner has failed to point out where any combination of proper prior art of record, discloses, teaches or suggests a structure as recited in Claims 16-19 or an image sensor package as recited in Claims 24 and 25. Therefore, Applicants respectfully submit that Claims 16-19, 24, and 25 are allowable over the proper prior art of record.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

As to 37 C.F.R. 116.

The amendments to the claims are directed to matter of form and to add clarity. Therefore, entry of this Amendment requires neither consideration of new issues nor a new search. Further, this Amendment places the application in a condition for allowance. Therefore, entry of this Amendment is appropriate under rule 116. If the Examiner should disagree, the Examiner is requested to enter the Amendment to narrow the issues on appeal.

#### CONCLUSION

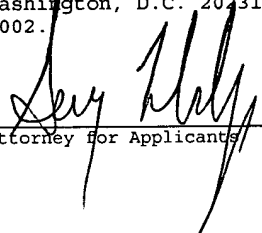
Claims 1 and 3-29 are pending in the application. For the foregoing reasons, Applicants respectfully request allowance of all pending claims. If the Examiner has any questions relating



to the above, the Examiner is respectfully requested to telephone the undersigned Attorney for Applicants.

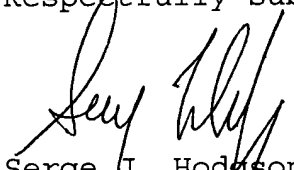
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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on September 18, 2002.

  
\_\_\_\_\_  
Attorney for Applicants

September 18, 2002  
\_\_\_\_\_  
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Respectfully submitted,

  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Thomas P. Glenn, Steven Webster, Roy Dale  
Hollaway  
Assignee: Amkor Technology, Inc.  
Title: FLIP CHIP ON GLASS IMAGE SENSOR PACKAGE  
Serial No.: 09/713,848 Filed: November 15, 2000  
Examiner: Graybill, D. Group Art Unit: 2827  
Docket No.: G0030

Monterey, CA  
September 18, 2002

CLEAN COPY OF REPLACEMENT CLAIMS

Replace the pending set of claims in the above  
application with the following set of claims:

1. (TWICE AMENDED) A structure comprising:  
an image sensor having an active area and a bond pad on a  
first surface of said image sensor;  
a window having an interior surface and an exterior  
surface opposite said interior surface, said interior surface  
of said window facing said first surface of said image sensor,  
the area of said interior surface of said window being less  
than the area of said first surface of said image sensor; and  
an electrically conductive via extending through said  
window from said interior surface to said exterior surface of  
said window, said via being electrically connected to said  
bond pad.

3. (AMENDED) The structure of Claim 1 wherein said  
structure is a chip size image sensor package.

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4. The structure of Claim 1 wherein said active area is responsive to radiation, said window being transparent to said radiation.

5. The structure of Claim 1 further comprising:  
an electrically conductive interior trace on said interior surface of said window; and  
an electrically conductive bump electrically connecting said bond pad to said interior trace.

6. The structure of Claim 5 wherein said interior trace is a land aligned with said via, said bump and said bond pad.

7. The structure of Claim 5 wherein said interior trace is a metallization extending along said interior surface of said window.

8. The structure of Claim 5 wherein said via is offset from said bump, said interior trace extending along said interior surface of said window to electrically connect said via to said bump.

9. The structure of Claim 1 further comprising an electrically conductive exterior trace on said exterior surface of said window, said exterior trace being electrically connected to said via.

10. The structure of Claim 9 further comprising an electrically conductive pad on said exterior trace.

11. (AMENDED) The structure of Claim 10 wherein said exterior trace is a land aligned with said via and said electrically conductive pad.

Cont'd  
81

12. The structure of Claim 10 wherein said exterior trace is a metallization extending along said exterior surface of said window.

13. (AMENDED) The structure of Claim 10 wherein said via is offset from said electrically conductive pad, said exterior trace extending along said exterior surface of said window to electrically connect said via to said electrically conductive pad.

14. The structure of Claim 1 wherein said window includes a central region and a peripheral region, said central region being aligned with said active area, said via being formed within said peripheral region.

15. The structure of Claim 14 further comprising a bead contacting said first surface of said image sensor and further contacting said peripheral region of said window, said bead forming a seal between said peripheral region of said window and said image sensor.

16. The structure of Claim 15 wherein said window, said bead, and said image sensor define a sealed cavity.

17. The structure of Claim 16 wherein said active area is responsive to radiation, said cavity containing a medium transparent to said radiation.

18. The structure of Claim 17 wherein said medium is air.

19. The structure of Claim 17 wherein said medium is an encapsulant.

20. The structure of Claim 1 further comprising an image sensor substrate comprising said image sensor.

21. (TWICE AMENDED) An image sensor package comprising:  
an image sensor having an active area and bond pads on a  
first surface of said image sensor;

a window having an interior surface and mounted to said  
image sensor, the area of said interior surface of said window  
being less than the area of said first surface of said image  
sensor;

a plurality of electrically conductive interior traces on  
an interior surface of said window;

a plurality of electrically conductive bumps electrically  
and physically connecting said bond pads to said interior  
traces;

a plurality of electrically conductive vias extending  
from said interior surface of said window to an exterior  
surface of said window, said vias being electrically connected  
to said interior traces;

a plurality of electrically conductive exterior traces on  
said exterior surface of said window, said exterior traces  
being electrically connected to said vias;

a plurality of electrically conductive pads on said  
exterior traces; and

a plurality of electrically conductive interconnection  
balls on said electrically conductive pads.

22. The image sensor package of Claim 21 wherein said  
window comprises a central region aligned with said active  
area and a peripheral region, said interior traces, said vias  
and said exterior traces being formed within said peripheral  
region.

23. The image sensor package of Claim 22 further  
comprising a bead forming a seal between said peripheral  
region and said image sensor.

24. The image sensor package of Claim 23 wherein said bead has sides coplanar with sides of said image sensor.

25. The image sensor package of Claim 24 wherein said image sensor package is chip size.

26. The image sensor package of Claim 21 further comprising an image sensor substrate comprising said image sensor.

27. (TWICE AMENDED) An image sensor package comprising:  
an image sensor having a bond pad on a first surface of said image sensor;

a window having an interior surface, the area of said interior surface of said window being less than the area of said first surface of said image sensor;

an electrically conductive interior trace on said interior surface of said window; and

an electrically conductive bump electrically connecting said bond pad to said interior trace.

28. (AMENDED) The structure of Claim 10 further comprising an electrically conductive interconnection ball on said electrically conductive pad.

29. (AMENDED) An image sensor package comprising:  
an image sensor having an active area and bond pads on a first surface of said image sensor;

a window mounted to said image sensor, the area of said window in a plane parallel to said first surface of said image sensor being less than the area of said first surface of said image sensor;

a plurality of electrically conductive interior traces on an interior surface of said window;

a plurality of electrically conductive bumps electrically and physically connecting said bond pads to said interior traces;

a plurality of electrically conductive vias extending from said interior surface of said window to an exterior surface of said window, said vias being electrically connected to said interior traces;

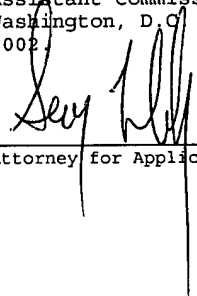
a plurality of electrically conductive exterior traces on said exterior surface of said window, said exterior traces being electrically connected to said vias;

a plurality of electrically conductive pads on said exterior traces; and

a plurality of electrically conductive interconnection balls on said electrically conductive pads.

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Washington, D.C. 20231, on September 18, 2002.

  
\_\_\_\_\_  
Attorney for Applicants

September 18, 2002  
Date of Signature